Chapter 8
CSR and Quantity Leadership in Restaurant Competition

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Abstract This paper investigates the critical role of Corporate Social Responsibility (CSR) in the food industry. It analyzes CSR's impact on competition between a CSR-focused restaurant and a traditional for-profit (FP) restaurant. The research employs a game theory model to examine how each restaurant chooses the quality and quantity of its products, influenced by its differing objectives (CSR vs. profit maximization). The study's main contributions include analyzing scenarios where a CSR restaurant competes with a traditional for-profit establishment, considering two leadership structures (CSR restaurant leading or FP restaurant leading the market), and determining equilibrium quality levels, quantities, profits, and overall social welfare in each model.

This paper investigates the effects of CSR within the food industry. We develop a model where a restaurant with a CSR focus competes with a traditional for-profit (FP) establishment in determining the quality and quantity of their offerings, in the order mentioned. Yet, while the levels of quality are chosen at the same time, the quantities are determined one after the other. Our analysis considers two leadership

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structures: (i) the CSR restaurant leading the market; and (ii) the FP restaurant leading the market.

Keywords Food industry · Corporate social responsibility · Sustainable tourism · Leadership · Social welfare

8.1 Introduction

Recent reports from the World Health Organization highlight a concerning reality: the second Sustainable Development Goal—the eradication of hunger—remains far from being achieved. Global malnutrition rates have stagnated over the past 3 years, a trend further aggravated by the socio-economic repercussions of the COVID-19 pandemic. By 2023, it is estimated that between 713 and 757 million people worldwide may be affected by hunger, equating to approximately one in every 11 individuals globally. This figure is even more alarming in Africa, where the prevalence rises to one in five (FAO et al., 2024). In this context, the food industry has a crucial role to play in tackling these challenges through the adoption of innovative and ethically responsible practices, the promotion of sustainable production methods, and a strengthened commitment to corporate social responsibility (CSR).

Although immediate hunger can be satisfied with low-quality food, the pursuit of food security must go beyond the mere availability of calories, focusing instead on access to nutritious and high-quality food to ensure long-term health and well-being. Food quality is not a simple concept; it is complex and multifaceted, varying across different situations and contexts. It can be assessed objectively, based on measurable characteristics such as chemical composition, but also subjectively, shaped by consumer expectations, perceptions, and preferences.

Food safety ensures that food is produced safely and free from harmful contaminants, thereby protecting public health, maintaining consumer confidence, supporting economic sustainability, and ultimately contributing to individual and community well-being (Nie & Chen, 2014; Chen et al., 2017). Barbosa and Pumpín (2024) found that companies investing in water management enjoy a stronger reputation among peers within the same sector, thereby enhancing their legitimacy and standing. According to Toukabri and Chaouachi (2025), from the perspective of the food industry consumer, economic and social sustainability exert a greater impact and influence, making it essential to consolidate and justify the values associated with premium cuisine.

The growth of sustainable tourism presents a significant opportunity for the food industry. As tourists increasingly seek eco-friendly dining experiences—including farm-to-table options and establishments that prioritize local, organic, and sustainable sourcing—there is a rising demand that encourages the food industry to adopt more sustainable practices. This shift directly contributes to the delivery of

higher-quality dishes for tourists. Food quality is a multifaceted concept that encompasses all the characteristics and attributes of a food product which influence its value to the consumer. It is not solely about taste; rather, it is a holistic assessment that includes both objective and subjective dimensions. Ultimately, high food quality aims to meet or exceed consumer expectations, offering a positive and satisfactory experience while ensuring safety and nutritional value.

Researchers have increasingly focused on quality competition in the food industry. For example, Chen et al. (2018) employed a two-stage dynamic duopoly model to analyse how reputation and quality influence competition between restaurants, with quality decisions preceding quantity choices (see also Ferreira et al., 2022). Building on this type of framework, Ferreira et al. (2021) examined a similar competitive environment, but with restaurants choosing prices rather than quantities after setting quality levels.

Nie and Chen (2014) examined how increasing competition (i.e., the number of firms) influences output, prices, and profits in a food industry oligopoly, where identical products compete in terms of quantity. Their findings indicated that greater competition reduced individual firm output and prices, diminished profits per firm, but enhanced social welfare. Yang and Nie (2016) explored how product substitutability affects asymmetric competition in the restaurant industry. They employed a two-stage game model to determine equilibrium outcomes under both Cournot and Stackelberg competition. Chen and Nie (2016) analysed the impact of Corporate Social Responsibility (CSR) in a mixed duopoly within the restaurant sector, in which one firm was profit-oriented while the other integrated CSR principles. Their model considered simultaneous decisions on quality, followed by quantity choices. The results showed that CSR adoption led to higher quality and quantity levels for the CSR-oriented firm, but the opposite for the profit-maximizing competitor.

CSR has been gaining significant importance in gastronomic tourism. In fact, the relevance of CSR in the food industry can be observed across various factors:

- *Builds Consumer Trust*: Consumers are increasingly concerned about the origins of their food, how it is produced, and the ethical practices of food companies. CSR initiatives—such as sourcing sustainable ingredients, ensuring fair labor practices, and maintaining transparency in production processes—can greatly enhance consumer trust.
- *Promotes Sustainability*: The food industry has a considerable environmental footprint. CSR promotes practices that reduce negative environmental impacts, including waste reduction, water and energy conservation, and support for sustainable agriculture.
- *Upholds Ethical Practices*: CSR involves maintaining high ethical standards in all areas of business, including fair treatment of workers, responsible sourcing, and honest marketing.
- *Encourages Innovation*: The pursuit of CSR objectives can foster innovation within the food industry. This may include developing new sustainable packaging, creating healthier food options, or adopting more efficient and ethical production methods.

The complex global challenge of climate change, characterized by widespread weather alterations and rising global temperatures, has emerged over recent decades. This phenomenon is expected to have a significant impact on both the availability and safety of our food supply (Duchenne-Moutien & Neetoo, 2021). Acknowledging the seriousness of this issue, the FAO has published key reports, including the foundational Climate Change: Implications for Food Safety in 2008 (FAO, 2008), and the more recent Climate Change: Unpacking the Burden on Food Safety in 2020 (FAO, 2020), which builds on the growing scientific understanding of the links between climate change and foodborne hazards.

The role of CSR within the tourism sector has been the subject of inquiry for numerous scholars (Font & Lynes, 2018). In exploring the impact of CSR on customer relationships within the food industry, Vasilev's (2025) study provides valuable insights. The research investigates how CSR strategies and practices foster consumer trust, satisfaction, and loyalty, acknowledging the growing consumer demand for ethical and sustainable business operations. It identifies key consumer expectations regarding social and environmental responsibility and analyses effective CSR initiatives implemented by leading companies in the sector. The study further evaluates the impact of these initiatives on customer engagement and the development of long-term relationships.

Biggi et al. (2024) examined the connection between CSR initiatives and state regulatory interventions designed to reduce food loss and waste. Their research revealed that food companies actively pursuing a CSR strategy, especially those that showcase their environmental and social achievements in their CSR reports, are more likely to successfully reduce food loss and waste.

Building on the work of Kong (2012) and Chen and Nie (2016) regarding CSR in the food industry, this study adopts their theoretical model to analyze the effects of CSR on key outcomes such as food quality, quantity, firms' profits, and consumer surplus. The model developed by Chen and Nie (2016) assumes that both firms initially determine product quality levels and subsequently select quantities. Ferreira et al. (2024), however, approached the market differently, treating quantities as the primary decision variable. This paper explores similar issues, but considers a sequential decision-making process for quality levels, rather than a simultaneous one.

Food industry managers can find essential guidance in Eledum and Elmahgop's (2024) research. It shows them how to integrate CSR into their core business strategies, foster innovation, and strengthen stakeholder relationships to achieve sustainable growth and profitability. The researchers' findings reveal that CSR significantly improves financial performance and competitive advantage, especially when companies focus on innovation.

Our study gives us some results that we can highlight, such as the Impact on CSR restaurant, impact on FP restaurant, overall industry impact, benefits for consumers and society, consumer surplus, and social welfare, which will be detailed below.

Impact on CSR restaurant: The study concludes that the presence of CSR positively influences the CSR restaurant. It leads to an enhancement of both the quality and

the quantity of food offered by the CSR-focused establishment. This could be due to the CSR restaurant's commitment to providing better, more sustainable options and potentially attracting a larger customer base due to its values.

Impact on for-profit restaurant: Conversely, the study finds that the competition from a CSR restaurant leads to a diminishment in both the quality and the quantity of food offered by the for-profit restaurant. This could be a strategic response to the CSR competitor, perhaps focusing on cost-cutting or targeting a different segment of the market.

Overall industry impact: Importantly, the study suggests that CSR has a positive impact on the food industry. It leads to an enhancement of both the overall quality and the overall quantity of food available in the market. This implies that the positive effects of the CSR restaurant outweigh the negative adjustments made by the FP restaurant.

Benefits for consumers and society: The research further concludes that CSR enhances both consumer surplus and social welfare.

Consumer surplus: This refers to the benefit consumers receive from purchasing goods or services at a price lower than their maximum willingness to pay. Higher quality and potentially greater availability of food due to CSR likely contribute to increased consumer surplus.

Social welfare: This is a broader measure of societal well-being, considering factors like consumer benefits, producer profits, and environmental impacts. The positive effects of CSR on quality, quantity, and potentially sustainability contribute to higher social welfare.

The paper distinguishes itself from previous research in its methodological approach, particularly in the sequencing of decisions within the game theory model.

Sequential vs. *simultaneous quality decisions*: While Chen and Nie (2016) examined a model where both firms simultaneously determined product quality levels and then quantities, this study introduces novelty by considering that restaurants choose quality levels sequentially, rather than simultaneously.

Quantity as primary decision variable: Unlike Ferreira et al. (2024), who modeled the market with quantities as the primary decision variable, and Ferreira et al. (2021) and Chen et al. (2018), who had quality decisions preceding quantity choices, this paper's model structure, where quality levels are chosen simultaneously but quantities are determined one after the other, with different leadership scenarios, is a key differentiator.

Leadership structures in quantity decisions: The study specifically analyzes two distinct scenarios based on which restaurant acts as the "leader" in the quantity decision-making process: (i) the CSR restaurant leading, and (ii) the FP restaurant leading, after an initial simultaneous quality setting. This detailed examination of sequential quantity decisions under different leadership appears to be a novel aspect.

Building on existing frameworks with a twist: The paper builds on market structures outlined by Chen and Nie (2016) and work by Kong (2012) and Chen and Nie

(2016), but diverges by assuming a sequential, rather than simultaneous, decision-making process for quantity.

This paper proceeds as follows: The model is established in the subsequent section. Following this, we describe the model, present our analysis and findings, and offer a comparison of sequential versus simultaneous decisions. The final section provides the conclusion.

8.2 Research Purpose and the Methodological Approach

The core purpose of this paper is to highlight the crucial role of CSR in the food industry and to analyze its impact on competition between a CSR-focused restaurant and a traditional FP restaurant. It also aims to explore the effects of CSR within the food industry by examining how two different types of restaurants make decisions about the quality and quantity of their offerings.

The objectives of the research are to analyze a scenario where a restaurant committed to CSR competes with a traditional for-profit restaurant; to model how each restaurant chooses the quality and quantity of its products, considering its differing objectives (CSR vs. profit maximization); to investigate the effects of CSR within the food industry; to develop a model where a CSR-focused restaurant competes with a traditional for-profit establishment in determining the quality and quantity of their offerings; to consider two leadership structures: (i) the CSR restaurant leading the market; and (ii) the FP restaurant leading the market; to determine the equilibrium quality levels and quantities, as well as the resulting profits for the restaurants and overall social welfare, in each model; and to analyze how the level of CSR influences the various outcomes of the model.

We analyze a scenario where a restaurant with a strong commitment to CSR competes directly with a traditional for-profit restaurant. The model focuses on how each restaurant chooses the quality and quantity of its products. These are likely influenced by their differing objectives (CSR versus profit maximization). We utilize game theory, a mathematical framework for analyzing strategic interactions between rational decision-makers. The game theory model provides a framework for understanding the strategic interactions between different types of food businesses in the context of CSR. This allows us to model how each restaurant's choices are influenced by the anticipated actions of the other. The paper examines two distinct scenarios based on which restaurant acts as the "leader" in the market:

(i) CSR restaurant as leader: After a simultaneous decision on quality levels, this implies the CSR restaurant makes its quantity decisions first, and the FP restaurant responds accordingly.
(ii) FP restaurant as leader: In this case, also after a simultaneous decision on quality levels, the FP restaurant sets its quantity first, and the CSR restaurant adapts its strategy.

Building on the market structure outlined by Chen and Nie (2016), our model diverges by assuming a sequential, rather than simultaneous, decision-making process for quantity. In the model studied by Ferreira, decisions about quality levels were made sequentially, whereas the quantities were chosen simultaneously.

We examine market competition between two distinct restaurants: R_1, characterized by its integration of CSR into its objectives, and R_2, driven by profit maximization. Throughout this paper, we will refer to R_1 as the CSR restaurant and R_2 as the for-profit (FP) restaurant. The representative consumer maximizes the utility function

$$U\left(q_1,q_2,x_1,x_2\right)-p_1q_1-p_2q_2,$$

where q_i is the quantity supplied by restaurant R_i, x_i is the quality level of restaurant R_i's offering, and p_i is the price set by restaurant R_i, for $i = 1, 2$. The linear inverse demand function for each restaurant R_i is given by:

$$p_i = 2x_i - q_i - \gamma q_j,$$

where γ is a measure of how substitutable the products offered by the two restaurants are, with $i, j = 1, 2$, $i \neq j$. Consequently, the direct demand function for restaurant R_i is expressed as:

$$q_i = \frac{1}{1-\gamma^2}\left(\alpha x_i - \alpha\gamma x_j - p_i + \gamma p_j\right).$$

The profit of restaurant R_i, denoted as π_i, is calculated as:

$$\pi_i = \left(p_i - x_i\right)q_i - \tau\left(x_i^2 - x_i\right).$$

In this formula, the cost of producing a food quantity q_i at quality level x_i is q_ix_i, and the fixed costs associated with quality level x_i are represented by $\tau\left(x_i^2 - x_i\right)$.

Assumption 1: To facilitate a simpler analysis, we adopt the parameter values $\gamma = \tau = 0.5$.

The CSR-focused restaurant R_1 aims to maximize $V = \pi_i + \theta CS$, reflecting its integration of CSR into business operations. This objective function includes its profit (π_1) and a weighted consumer surplus (θCS), where the CSR degree θ falls within the range [0, 1]. The consumer surplus (CS) is defined as $CS = \frac{1}{2}\left(q_1^2 + q_2^2\right) + \gamma q_1q_2$. In contrast, the for-profit (FP) restaurant R_2 seeks to maximize its standard profit function, π_2.

The measure of social welfare, W, is defined as the addition of the profit earned by restaurant R_1, the profit earned by restaurant R_2, and the resulting consumer surplus:

$$W = \pi_1 + \pi_2 + CS.$$

The methodology employs a three-stage game theory model to analyze non-cooperative competition. In both cases, the first stage involves simultaneous quality setting by both restaurants. The cases diverge in the subsequent quantity decisions:

- *Case I*: After simultaneously setting quality, the CSR restaurant chooses its quantity, followed by the FP restaurant's quantity choice;
- *Case II*: After simultaneously setting quality, the FP restaurant chooses its quantity, followed by the CSR restaurant's quantity choice.

In each model, we explicitly determine the equilibrium quality levels and quantities. Furthermore, we calculate the resulting profits for the restaurants and the overall social welfare. We also analyze how the level of CSR influences the various outcomes of the model.

8.3 Results I: CSR Restaurant as Leader

Let's break down this marketing competition using a three-stage game:

- First, both restaurants simultaneously determine the quality levels of their products, x_1 and x_2;
- Next, the CSR restaurant determines the quantity it will offer, q_1;
- Finally, the FP restaurant observes CSR restaurant's choice and then sets its own quantity, q_2.

The model presented above is analyzed and solved via backward induction.

Analyzing the final stage's optimality condition, $\partial\pi_2/\partial q_2 = 0$, results in the following solution:

$$q_2 = \frac{2x_2 - q_1}{4}. \tag{8.1}$$

Substituting (Eq. 8.1) into the objective function V for restaurant R_1, and maximizing with respect to q_1 ($\partial V/\partial q_1 = 0$), we obtain the following expression for q_1:

$$q_1 = \frac{2\left(8x_1 - \left(2-\theta\right)x_2\right)}{28 - 13\theta}. \tag{8.2}$$

Then,

$$q_2 = \frac{-4x_1 + \left(15 - 7\theta\right)x_2}{28 - 13\theta}. \tag{8.3}$$

In the initial stage, CSR restaurant R_1 determines its optimal quality level x_1 by maximizing its objective function V. At the same time, FP restaurant R_2 decides on its ideal quality level x_2 to make the most profit π_2. To find this equilibrium, we substitute Eqs. (8.2) and (8.3) into the definition of V and π_2. Then, by solving the first-order conditions, $\partial V/\partial x_1 = 0$ and $\partial \pi_2/\partial x_2 = 0$, we arrive at the equilibrium quality levels for restaurants R_1 and R_2:[1]

$$x_1^I = \frac{222 - 200\theta + 45\theta^2}{2\left(126 - 212\theta + 71\theta^2\right)}, x_2^I = \frac{216 - 464\theta + 169\theta^2}{2\left(126 - 212\theta + 71\theta^2\right)}. \tag{8.4}$$

By inserting (Eq. 8.4) into Eqs. (8.2) and (8.3), the equilibrium quantities become:

$$q_1^I = \frac{48 + 6\theta - 13\theta^2}{126 - 212\theta + 71\theta^2}, q_2^I = \frac{84 - 235\theta + 91\theta^2}{2\left(126 - 212\theta + 71\theta^2\right)}.$$

Assumption 2: To ensure interior solutions exist, we assume $\theta < 3/7$.

Proposition 1. The results demonstrate that the CSR restaurant excels in both food quality and quantity when compared with the FP restaurant.

The profits for restaurant R_1 (π_1) and restaurant R_2 (π_2) are given by:

$$\pi_1^I = \frac{22788 - 71856\theta + 65944\theta^2 - 23954\theta^3 + 3039\theta^4}{8\left(126 - 212\theta + 71\theta^2\right)^2},$$

$$\pi_2^I = \frac{21888 - 87024\theta + 122718\theta^2 - 66252\theta^3 + 11999\theta^4}{8\left(126 - 212\theta + 71\theta^2\right)^2}.$$

Moreover, the consumer surplus (CS) and social welfare (W) are expressed as:

$$CS^I = \frac{24336 - 58728\theta + 69397\theta^2 - 36192\theta^3 + 6591\theta^4}{8\left(126 - 212\theta + 71\theta^2\right)^2},$$

$$W^I = \frac{69012 - 217608\theta + 258059\theta^2 - 126398\theta^3 + 21629\theta^4}{8\left(126 - 212\theta + 71\theta^2\right)^2}.$$

A comparative static analysis will now be conducted to evaluate the impact of CSR adoption on market equilibrium outputs. Through straightforward calculations, we arrive at the subsequent findings.

[1] Throughout the paper we use the notation superscript I to refer to the CSR restaurant leader case.

Proposition 2. Greater CSR involvement boosts both the quality and quantity of food at the CSR restaurant but reduces these at the FP restaurant.

So, we can say that when a CSR-focused restaurant increases its commitment to CSR (perhaps by investing more in sustainable practices, ethical sourcing, or community support), it benefits in two ways: (a) Food quality improves, likely because of better sourcing, attention to health, or customer satisfaction; (b) Food quantity increases, perhaps because CSR attracts more customers (increased demand), or more resources become available to serve more food. However, the same increase in CSR involvement has a negative effect on traditional for-profit restaurants: (a) Quality drops, possibly because the FP restaurant cannot or will not match the CSR efforts (e.g., they may cut costs to compete); (b) Quantity also drops, possibly because they lose custom to CSR restaurants or have fewer resources to produce the same amount of food. So, increased CSR creates competitive pressure, and if FP restaurants do not adapt, they suffer.

Proposition 3. The analysis also reveals that as CSR engagement grows, the differences in both food quality and quantity become more pronounced, and the total quantity of food also tends to increase.

According to this proposition, higher CSR levels drive an increase in the quantity of offerings, whilst simultaneously making the differences between companies with varying CSR commitments more apparent.

Proposition 4. While the FP restaurant's profits tend to decrease as the CSR restaurant invests more in CSR, there is an inverse U-shaped relationship between the CSR restaurant's own level of CSR engagement and its profitability.

The findings indicate an ambiguous effect of increased CSR engagement on a CSR restaurant's profitability. However, greater social responsibility in CSR restaurants, conversely, leads to profit losses for traditional FP restaurants.

Let us now expand the interpretation and commentary of empirical results in this scenario, in which, after both restaurants simultaneously set their quality levels, the CSR restaurant makes its quantity decision first, followed by the FP restaurant.

The study concludes that the CSR restaurant, by leading with its CSR commitment, experiences a positive influence on its operations. This leads to an improvement in both the quality and quantity of food offered by the CSR-focused establishment. This outcome is likely attributed to the CSR restaurant's dedication to providing superior, more sustainable options, which in turn can attract a larger customer base due to its alignment with consumer values.

Conversely, when a CSR restaurant is present and takes a leading role, it results in a reduction in both the quality and quantity of food provided by traditional for-profit restaurants. This could be a strategic response from the FP competitor, possibly involving cost-cutting measures or a shift in focus to a different market segment to compete with the CSR-driven establishment.

Importantly, the study suggests that CSR has a net positive impact on the food industry. The positive effects observed in the CSR restaurant, in terms of increased

quality and quantity, appear to outweigh the negative adjustments made by the FP restaurant. This implies that CSR drives an overall improvement in the quality and quantity of food available in the market.

The research further concludes that CSR significantly enhances both consumer surplus and social welfare. This indicates that consumers benefit more, as they are able to purchase goods or services at a price lower than their maximum willingness to pay. The higher quality and potentially greater availability of food, driven by CSR, is likely to contribute to this increased consumer surplus. The positive effects of CSR on food quality, quantity, and potential sustainability efforts contribute to a higher overall social welfare.

8.4 Results II: FP Restaurant as Leader

We will now explore a marketing competition by applying the following three-stage game model:

- First, both restaurants simultaneously choose their product quality levels;
- Knowing the quality levels, the FP restaurant then decides on its offering quantity;
- Observing the FP restaurant's quantity, the CSR restaurant sets its own quantity.

Applying the same analytical approach as in the previous section yields the following equilibrium outcomes:[2]

$$x_1^{II} = \frac{3\left(6-5\theta+\theta^2\right)}{21-35\theta+12\theta^2}, x_2^{II} = \frac{111-278\theta+183\theta^2-36\theta^3}{2\left(63-126\theta+71\theta^2-12\theta^3\right)},$$

$$q_1^{II} = \frac{21+4\theta-19\theta^2+6\theta^3}{\left(3-\theta\right)\left(21-35\theta+12\theta^2\right)}, q_2^{II} = \frac{4\left(6-19\theta+14\theta^2-3\theta^3\right)}{\left(3-\theta\right)\left(21-35\theta+12\theta^2\right)},$$

$$\pi_1^{II} = \frac{1368-5019\theta+6323\theta^2-3638\theta^3+942\theta^4-63\theta^5-9\theta^6}{2\left(3-\theta\right)^2\left(21-35\theta+12\theta^2\right)^2},$$

$$\pi_2^{II} = \frac{1899-8211\theta+13441\theta^2-9945\theta^3+3384\theta^4-432\theta^5}{8\left(3-\theta\right)\left(21-35\theta+12\theta^2\right)^2},$$

[2] Throughout the paper we use the notation superscript *II* to refer to the FP restaurant leader case.

$$CS^{II} = \frac{1521 - 4980\theta + 8098\theta^2 - 7428\theta^3 + 3801\theta^4 - 1008\theta^5 - 108\theta^6}{2(3-\theta)^2\left(21 - 35\theta + 12\theta^2\right)^2},$$

$$W^{II} = \frac{3\left(1917 - 6753\theta + 9551\theta^2 - 6543\theta^3 + 2160\theta^4 - 276\theta^5\right)}{8(3-\theta)\left(21 - 35\theta + 12\theta^2\right)^2}.$$

Unlike the previous scenario, if the FP restaurant takes the lead, it can achieve higher production and quality levels, particularly when the other restaurant's commitment to social responsibility is limited. Similarly, the remaining qualitative outcomes align with those observed when the CSR restaurant held the leading position.

Let us now expand the interpretation and commentary of empirical results in this scenario in which, after both restaurants simultaneously set their quality levels, the FP restaurant makes its quantity decision first, followed by the CSR restaurant.

Unlike the previous scenario, if the FP restaurant takes the lead, it can achieve higher production and quality levels. This advantage is particularly noticeable when the CSR restaurant demonstrates a limited commitment to social responsibility. This suggests that a strong profit-driven leadership can dominate the market if the CSR competitor is not as heavily invested in its social mission.

Despite the change in leadership, the study found that the remaining qualitative outcomes largely align with those observed when the CSR restaurant held the leading position. This implies that while leadership dictates who gains the initial advantage in terms of production and quality, the underlying competitive dynamics and their broader implications for the industry and society remain similar in nature.

8.5 Comparisons

Here, we present a comparison of selected results derived from the two models. Based on the quantitative results, we can establish the following:

- The aggregate quantity in the market is higher when the leader is the CSR restaurant.
- A restaurant achieves better quality in its production by taking on a leadership role.
- A leader restaurant's commitment to social responsibility enhances social welfare.

The comparison of results from both models reveals important insights. The total quantity of food in the market is higher when the CSR restaurant assumes the leadership role. This reinforces the idea that CSR, when championed by a market leader, can lead to a greater overall supply of food.

Furthermore, a restaurant achieves better quality in its production when it takes on a leadership role, regardless of whether it's the CSR or FP restaurant. This

suggests that the strategic advantage of being a first-mover in quantity decisions allows the leader to optimize its quality more effectively.

Crucially, the study finds that a leader restaurant's commitment to social responsibility enhances overall social welfare. This highlights the significant societal benefit derived when a market leader, especially one with CSR principles, influences market dynamics.

8.6 Conclusions

Employing a dynamic game theory model, this study investigated CSR strategies in a duopolistic food industry. We considered two distinct scenarios: the first where a CSR-focused restaurant acted as the market leader, and the second where a for-profit restaurant held the leadership position.

Results from the first scenario highlight the CSR restaurant's advantage in food quality and quantity over the FP restaurant. Conversely, should the FP restaurant assume a leading position, it can attain elevated levels of production and quality, particularly in circumstances where the other establishment demonstrates a limited commitment to social responsibility. We also established that when a restaurant takes the lead, it elevates the quality of its production. Furthermore, the commitment to social responsibility demonstrated by a leading restaurant contributes to the enhancement of social welfare.

The paper's exploration of different leadership scenarios (CSR vs. FP restaurant leading) highlights that market dynamics vary. Internationally, this means that policy approaches to fostering CSR in the food sector might need to be adapted to the specific competitive landscapes of different countries or regions. In markets dominated by large multinational corporations, different strategies might be required compared to those with a prevalence of small, local businesses.

In conclusion, this research suggests that the integration of CSR principles in the food industry, even in a competitive environment, can lead to positive outcomes for both consumers and society by encouraging higher quality and quantity of food, particularly from CSR-focused businesses, and ultimately pushing the entire industry towards more responsible practices.

Furthermore, the empirical findings of this study provide valuable policy insights for governments and regulatory authorities seeking to encourage sustainable and responsible practices in the food sector. These policies may (i) involve promoting the adoption of CSR in the food industry through incentives for CSR initiatives and public recognition programs; and (ii) leverage CSR to enhance social welfare by integrating it into food security strategies and consumer awareness initiatives.

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